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# Greenbank Electronics

## Additional Information on Kitbug-MM-3 ('K3').

General Information on addresses, RAM requirements etc., is given in our leaflet 'SW4'. Operation is generally the same as for the 'Kitbug' program from which K3 is derived, and therefore the booklet 'A Guide to Kitbug' may prove helpful. If you do not have both of these items, please contact us for advice.

K3 is a memory-mapped version of the serial program Kitbug, with further modifications to permit it to be run on page 3 (i.e. hex address 3000), usually in conjunction with NIBL-MM. For the latest information on NIBL-MM see our notes reference AN-C12/1.

The various routines in Kitbug are to be found at similar addresses in the K3 monitor, but they have been modified where necessary to suit memory-mapped operation. The use of the memory-mapping technique for input/output confers the benefits of speed and flexibility, but there is an area where the loss of the serial input/output routines would cause inconvenience, and some additional routines have been included in the K3 monitor to prevent this.

The difficulty would occur if the CLOAD and CDUMP (cassette load and cassette dump) routines in the 'U3' ('Utilities') PROM were used. They take advantage of the monitor's GECO and PUTC routines to format the data into serial form, suitable for tape recording via the TPA-2 printed circuit board. As the GECO and PUTC routines in the memory-mapped (K3) monitor have been modified for memory-mapped operation they are no longer suitable for the purpose of tape recording.

To prevent this resulting in any difficulty, and as a bonus, the K3 monitor includes some additional routines, extra to those advertised: CLOAD, CDUMP, GECO "2", PUTC "2". In summary K3 is as follows:

3000-301F	EXIT Routine	- as for serial Kitbug.
3020-3038	ENTRY Routine	- " "
303A-3055	COMMAND Routine	- " "
3056-30CA	"G", "T", or "M" Routine	- " ", except for addition of hex 3000 to various addresses (GHEX, PUTC, PHEX etc.)
30CC-30DA	ERROR Routine	- " "
30DC-313C	GHEX/GHEX2	- " "
313E-3184	PHEX/PHEX2	- " "
3186-313C	GECO	} Different to serial Kitbug to allow memory mapped operation
315C-331F	PUTC	

### Additional Routines:

3320-335B	CLOAD	- Used with GECO"2" at 33A0
335C-339C	CDUMP	- Used with PUTC"2" at 33D0
33A0-33CF	GECO"2"	- Modified GECO for use with CLOAD
33D0-33FB	PUTC"2"	- Modified PUTC for use with CDUMP

RXD from the tape should be connected to the Sense A line, and TXD (via an inverter, see below) to the FØ line. The baud rate with a 2MHz crystal using these routines is 11Ø baud, and with a 4MHz crystal it is 3ØØ baud.

The normal convention for recording data and receiving it back, is that the output line is idling high - a low bit being used to indicate start of data. It is therefore necessary to include an inverter in the FØ line, e.g. by using a spare gate inserted between SC/MP pin P19 and the output buffer. To recover the data from cassette pins 6/11 of IC9 on TPA board should be connected to earth.

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